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THE DOUGLAS-FIR TUSSOCK MOTH IN NORTHEASTERN OREGON -- 1989

STATUS AND INFORMATION REPORT

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Background

The Douglas-fir tussock moth, Orgyia pseudotsugata, is one of the most destructive forest insect defoliators in western North America. Populations can build up rapidly to outbreak levels in susceptible host stands and within a three year period cause considerable growth loss, topkill, and whole tree mortality (Wickman et al., 1973) before collapsing to endemic levels. Outbreaks generally last 3 or 4 years. A virus disease epizootic in the tussock moth population is responsible for the natural collapse and termination of outbreaks.

Outbreaks occur at intervals of roughly 7 to 10 years (Clendenen, 1975). The last major tussock moth outbreak to occur in the Pacific Northwest began in portions of the Okanogan Valley of north-central Washington in 1971 (Pettinger et al., 1972). During subsequent years, the tussock moth increased in this and other locations until the outbreak eventually covered about 800,000 acres in eastern and central Washington, northeastern Oregon, Idaho, and western Montana (Graham et al., 1975). With an emergency authorization approved by the U.S. Environmental Protection Agency (EPA), the U.S. Forest Service in 1974 conducted a highly controversial tussock moth control project with DDT on over 420,000 acres of infested forests in Oregon, Washington, and Idaho (Ciesla, 1978). Approval of use of DDT by then EPA Administrator Russell Train, was granted with the condition that the Forest Service develop safe and effective alternatives to DDT for controlling Douglas-fir tussock moth outbreaks. DDT could not be used again for control of forest insects.

In 1974, Congress authorized The Expanded Douglas-fir Tussock Moth Research and Development Program along with other programs for the gypsy moth and southern pine beetle. In its amendment to the budget, the 93rd Congress stated the objectives of the program were to implement the available technological improvements for reducing losses from the insects, and develop and evaluate new short- and long-term forest pest management systems which will effectively suppress or prevent infestations. Among the various research and development products to come out of this accelerated effort were three important tools for use by forest managers to detect, evaluate, and suppress outbreak populations.

Detection

Detection is done by utilizing an adult male moth trapping system that employs the synthetic sex attractant or sex pheromone of the female moth within a "sticky" trap. These pheromone traps are used to monitor populations of tussock moth and provide an early warning system to detect changes in population levels and determine outbreak potential (Daterman et al., 1979). The Douglas-fir Tussock Moth Early Warning System has been in effect since 1980, Regionwide. The system allows forest managers to detect potential outbreaks early, before any tree damage occurs. Trap catches are compared to an index value that indicates the potential for visible defoliation within the next two summer seasons.

Evaluation

Once detection indicates tussock moth populations are increasing and have outbreak potential, an evaluation of the population is made in early summer during the larval feeding stage to further refine estimates and provide additional information about the populations. Sampling procedures are used to either estimate precise density of larvae, or to classify the number of larvae on plots within a given stand into a general density category, depending on the status of the tussock moth population and the purpose for which the sampling information is to be used (Mason, 1979). The sampling procedures aid the forest manager in determining the present number of insects in a stand and the potential for outbreaks and visible defoliation. Together with the use of models, the land manager can evaluate this information to reach a decision about whether or not to suppress an outbreak.

Suppression

If population suppression becomes necessary, the forest manager has yet another tool available to accomplish the objective. A naturally-occurring virus that typically causes collapse of populations of Douglas-fir tussock moth in nature has been developed and registered with the EPA for use as a biological pesticide against tussock moth populations. The Forest Service has been producing and stockpiling supplies of the microbial insecticide since 1980, and now has several hundred-thousand acre-doses of the virus in anticipation of treatment of the next tussock moth outbreak. The virus is effective against the Douglas-fir tussock moth and will not harm warm-blooded animals, birds, and fish. The spectrum of activity is extremely narrow. In addition to the Douglas-fir tussock moth, the virus has activity against three related tussock moth species, two of which occur in the west. It does not harm any other insects or other invertebrates. Other pesticides which have registered use against Douglas-fir tussock moth include the biological insecticide, Bacillus thuringiensis and the chemical insecticide, Carbaryl.

Current Situation

Trends in tussock moth catches have fluctuated up and down in northeastern Oregon during the past eight years the Early Warning System has been in effect. In a few locations on the Wallowa-Whitman and Malheur National Forests, however, moth averages have been on the steady increase for the past three seasons. In some cases, averages are exceeding 90 moths per trap. The current index value to indicate outbreak potential is 40 moths per trap. Douglas-fir tussock moth trap catches for the period 1986-1988 are summarized in Table 1. Ranger Districts showing increases in the number of moths trapped are the Pine RD on the Wallowa-Whitman NF and the Burns RD on the Malheur NF. Visual searches for tussock moth egg masses on the Pine RD this past fall were unsuccessful. No egg masses were found.

Because of the increasingly high numbers of moths captured in pheromone traps in certain locations, we will be further evaluating larval populations in these areas during the late spring of 1989. We will utilize larval sampling procedures mentioned previously.

Scientists with the Pacific Northwest Research Station at La Grande have been monitoring larval populations in some of these same areas for many years. To date, their sampling results indicate that the current populations are unlikely to have immediate outbreak potential.

Prognosis

Evidence from pheromone trapping over the past three seasons suggests that Douglas-fir tussock moth populations are on the increase in certain locations. So far, there is little correlation of these results with larval sampling that has been conducted either in proximity to some of the trap sites or at other locations in northeastern Oregon. What these differing results mean biologically is unclear. Further evaluation and monitoring are needed before we are ready to say an outbreak of tussock moth is eminent.

Since trap averages do seem to fluctuate somewhat from year to year, we believe it is more important to focus on the trend over time than on specific trap catches in any given year. We have seen trends increase to where the index level was reached or exceeded one year, only to have moth catches decline the following year. We are concerned to the point that we will continue to follow the situation closely with evaluation sampling this spring, followed by pheromone trapping again in the fall.

Should evaluation sampling of larval populations and pheromone trapping of male moths indicate a pending outbreak and the need for suppression, forest managers will have adequate time to prepare for the suppression effort. With the availability of TM BioControl-1, the biological insecticide for the Douglas-fir tussock moth, they will also be equipped with a safe and effective tool to strike a lethal blow to this destructive pest of Douglas-fir and true firs.

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Table 1. Douglas-fir tussock moth trap catches in northeastern Oregon, 1986-1988.

Forest	Ranger District	Location	Average Number Moths per Trap 1986	1987	1988
Malheur	Bear Valley	T14S R28E Sec22	0.2	0.2	0.0
		T15S R31E Sec36	2.0	0.7	0.0
		T16S R28E Sec30	12.0	0.4	1.0
	Burns	T21S R32.5E Sec4	18.0	2.2	74.8
		T20S R32E Sec34	0.2	1.0	11.6
		T18S R31E Sec32	4.6	2.8	6.0
		T18S R30E Sec30	--	0.2	3.2
		T19S R29E Sec33	67.4	21.7	92.4
		T19S R28E Sec18	--	0.2	1.0
	Long Creek	T10S R30E Sec20	0.0	0.0	2.0
		T10S R31E Sec14	5.2	2.2	3.8
		T11S R33E Sec1	0.0	0.6	0.4
		T11S R35.5E Sec13	0.2	0.0	0.0
		T11S R30E Sec32	2.4	3.8	0.0
	Prairie City	T17S R35E Sec33	0.0	1.4	0.0
		T17S R34E Sec12	0.0	6.8	0.0
		T15S R34E Sec31	0.0	0.0	0.2
		T16S R35E Sec3	0.0	0.6	1.0
Umatilla	N.Fork John Day (vice Dale)	T7S R30E Sec24	2.6	5.0	0.0
		T8S R31E Sec14	0.2	0.2	0.0
		T7S R33E Sec31	0.4	0.4	0.0
		T9S R35E Sec10	0.0	0.0	0.0
	N.Fork John Day (vice Ukiah)	T5S R29E Sec25	0.0	0.0	0.2
		T6S R33E Sec3	0.0	0.0	0.0
		T3S R33E Sec31	0.0	0.0	0.0
	Heppner	T8S R26E Sec10	1.4	0.2	0.6
		T7S R26E Sec7	0.0	0.0	0.0
		T6S R26E Sec26	0.0	0.0	0.2
		T6S R28E Sec5	0.0	0.0	0.0
	Pomeroy	T9N R42E Sec4	0.2	0.4	0.0
		T7N R44E Sec2	0.0	0.0	0.0
		T9N R41E Sec21	0.0	0.2	0.0
		T9N R43E Sec30	1.0	0.0	0.0
		T8N R40E Sec33	0.2	0.0	0.0
		T7N R43E Sec29	0.0	0.4	0.2

Table 1. Douglas-fir tussock moth trap catches in northeastern Oregon, 1986-1988. (continued)

Forest	Ranger District	Location	Average Number Moths per Trap 1986	1987	1988
Umatilla	Walla Walla	T5N R41E Sec3	0.2	0.0	2.2
		T5N R42E Sec3	0.4	0.0	0.0
		T4N R38E Sec34	0.0	0.2	0.0
		T3N R37E Sec11	1.0	0.0	0.0
		T2N R38E Sec32	0.0	0.0	0.0
		T1S R37E Sec29	0.2	0.2	0.6
		T1N R37E Sec6	0.0	0.0	0.6
		T1S R36E Sec21	0.6	0.8	0.6
Wallowa-Whitman	Baker	T7S R38E Sec1	0.0	0.2	0.0
		T9S R39E Sec22	0.0	0.0	0.0
		T10S R38E Sec25	0.0	0.0	0.0
		T11S R41E Sec19	0.0	0.0	0.0
	Wallowa Valley	T3S R47E Sec32	1.7	1.8	0.0
		T3S R46E Sec29	4.5	0.0	0.2
		T4N R46E Sec32	12.2	8.5	0.0
		T3N R47E Sec33	3.0	6.0	0.0
		T2N R45E Sec30	1.7	4.2	2.0
		T3N R43E Sec9	0.2	0.0	0.0
		T3N R44E Sec9	3.0	0.6	0.0
	Hells Canyon NRA	T4S R48E Sec33	2.6	1.0	2.8
		T1S R48E Sec1	1.8	0.0	2.6
		T1S R49E Sec33	0.0	0.0	0.0
		T5S R48E Sec32	13.0	0.0	4.4
	Eagle Cap Wild.	T1S R42E Sec6	0.0	0.0	0.2
		T1S R43E Sec32	0.0	0.0	0.0
	La Grande	T3S R34E Sec3	0.0	0.2	0.0
		T4S R36E Sec29	0.4	0.0	0.2
		T5S R38E Sec4	0.2	0.2	0.0
	La Grande (vice Union)	T1S R41E Sec8	0.0	0.0	0.0
		T3S R41E Sec21	0.0	0.0	0.0
		T5S R41E Sec3	9.0	0.0	3.0
		T1S R37E Sec34	0.2	0.0	0.0
		T7S R42E Sec11	2.8	2.4	6.8
	Pine	T7S R46E Sec11	6.3	66.7	91.0
		T7S R46E Sec5	5.5	37.4	40.2
		T7S R44E Sec3	0.6	0.6	30.0
		T6S R46E Sec28	1.0	0.8	18.4

Table 1. Douglas-fir tussock moth trap catches in northeastern Oregon, 1986-1988. (continued)

Forest	Ranger District	Location	Average Number Moths per Trap 1986	1987	1988
Wallowa-Whitman	Unity	T14S R36E Sec1	0.0	0.0	4.4
		T15S R37E Sec11	0.2	0.8	0.8
		T11S R37E Sec17	0.0	0.2	0.0
		T12S R36E Sec6	0.0	0.0	2.8